

that cannot be distinguished from the original by simple observation. Mr. Theodore Andrea Cook, in his preface to the volume, refers to "mechanical accuracy, assisted and improved by skilfully delicate and reverentially careful handiwork," and thus sums up the position according to the facts of the case. The colours are not accurate by reason of the fact that the printing blocks are made by photographic means, although this may be claimed for the drawing—that is, the outline. In describing the process of three-colour printing, we have endeavoured to show how that imperfection and compromise qualify every step of the work. It is therefore necessary to examine the first proof by critically comparing it with the original, and then to make such alterations as are required in the three printing plates, by re-etching wholly or partially, by hand engraving, burnishing, and similar methods, continuing to make proofs and effect the needed changes until the differences are eliminated. At Messrs. André and Sleight's this examination and hand work are carried out by trained artists, as distinguished, that is, from photographers and printers, and it is to the scrupulous care bestowed upon this adjustment of the plates by hand that the perfection of the prints depends. The justification lies in the result, and, whatever may be said for or against any principle of work, it is by the practical result only that it can, at present, be finally judged. If a copyist were to paint a copy of a picture, we should naturally seek the opinion of eminent painters as to the merits of the copy. Three-colour reproductions put forward as these are must naturally be judged in the same way, and it is a source of gratification to all interested in the technics of three-colour work to know that these reproductions have received the warm approval of many of our best known painters. But it is easy to believe that there is room for a little difference of opinion, and that a critical comparison with the originals would reveal possibilities of improvement. Such have been pointed out, and presumably no three-colour work will ever be done for which absolute faultlessness can be rightly claimed. But there is a possibility of error even in this criticism. For as the reproduction is not done in the same pigments as the original it follows that the effect of a difference of illumination will not be the same on both. If the reproduction were perfect as compared with the original by ordinary good daylight, there would probably be differences noticeable to a trained eye if they were compared on a dull day; and this probability must exist however the copy is made if the pigments used are different from those in the original. Moreover, no work in colour appears as it is intended to unless it is illuminated by the light by means of which it was produced or a quite similar light, and this is a physical law which must ever obtain.

There have been a few attempts to simplify the three-colour process by the use of one screen only, the three colours being arranged upon it. Perhaps the best known of these is due to Prof. Joly, who arranges his colours in triple parallel lines. The most recent, and the boldest in its conception, has only just been published by Messrs. Lumière. They sort out from potato starch granules from 0.015 to 0.02 mm. in diameter, and colour separate lots of these red, green, and violet respectively. When quite dry the coloured granules are mixed in such proportions that the mass appears grey, with no predominance of either colour, and a waxed glass is coated with them to form a layer only one granule thick. To prevent the interstices from passing white light, they are filled up with a fine black powder. There is next applied a varnish which has as nearly as possible the same refractivity as the starch.

NO. 1824, VOL. 70]

By this means is obtained an irregular-grained triple-colour screen. To prepare it for producing the picture it is coated with a suitably sensitised emulsion. The plate is exposed through the glass, developed, the silver image dissolved away, and the remaining silver salt reduced to the metallic state to form the image. Thus is obtained the completed transparency. It is obvious that if such plates ready for exposure were supplied commercially, the making of coloured transparencies would be much more simple than when three negatives and three prints have to be made. There must be many practical difficulties to surmount in the preparation of such compound plates, and, as in all cases of three-colour work, the process must at present be judged by the results that it yields rather than by the apparent soundness or otherwise of the theories upon which it is based.

The small volume by Mr. R. Child Bayley forms a good introduction to the subject of colour photography, as it is written in such simple language that it may be "understood and followed by any reader, even by one without the slightest acquaintance with photography," as the author states in his preface. At the same time sufficient formulæ and precise details are given for the practical working of those processes that are within the experimental possibilities of the photographer.

CHAPMAN JONES.

NOTES.

THE French physicians and surgeons who are visiting London arrived on Sunday. On Monday the president and council of the Royal College of Surgeons received the visitors, who were shown the collections in the museum. Parties have during the past three days visited the principal hospitals, general and special, the physiological laboratories of the University of London and the laboratories of the Cancer Research Fund, the Lister Institute, the Middlesex Hospital cancer department, the pathological laboratory of the County Council Asylum at Claybury, and the London School of Tropical Medicine. Receptions have been given by the editors of the *Lancet*, Dr. and Mrs. Dundas Grant, and the Dean of the Faculty of Medicine of the University of London and Mrs. Butlin. On Wednesday night the visit was brought to a close by a banquet at the Hotel Cecil.

THE Government of the Federated Malay States has decided to establish an agricultural department in Malay, and has appointed Mr. J. B. Carruthers, the Government mycologist and assistant director of the Royal Botanic Gardens of Ceylon, to be director of agriculture and Government botanist. The Federated Malay States have an area of more than 25,000 square miles, and the agricultural potentialities are very promising. Large areas are being planted with rubber plants, and sugar and cocoanuts are extensively cultivated. There are two botanic gardens and a rubber experiment station in the Malay States, and all three are, we understand, to be administered by the new department.

ON October 6 the Antarctic relief ship *Morning* arrived at Plymouth from Lyttelton after an absence of about two and a half years.

THE first monthly general meeting of the new session of the Institution of Mechanical Engineers will be held on Friday, October 21. A paper by Mr. R. M. Neilson on "A Scientific Investigation into the Possibilities of Gas Turbines" will be read and discussed.

ACCORDING to the Paris correspondent of the *Daily Chronicle*, Dr. Laveran, of the Pasteur Institute, has discovered a remedy for sleeping sickness, and has already tried it with success upon animals previously inoculated with the disease.

At the meeting of the Royal Microscopical Society on Wednesday, October 19, a demonstration entitled "The Re-construction of a Fossil Plant" will be given by the president, Dr. Dukinfield H. Scott, F.R.S.

A REUTER telegram from Paris states that a radiographic station has been opened at Ushant for the purpose of communicating with ships at sea. The station will transmit messages from the mainland, and will receive messages for addresses in France, Algeria, Tunis, Monaco, and Andorra.

THE *Chemist and Druggist* states that a congress of chemistry and pharmacy, organised under the auspices of the Pharmaceutical Association of Liège and the Chemical Society of Belgium, will be held in connection with the International Exposition to be held at Liège in July, 1905. Communications should be addressed to one of the secretaries, M. J. Raymond, 16 Place des Carmes, Liège, or M. J. Wauters, 83 rue Souveraine, Brussels.

THE Childhood Society announces that a course of four public lectures will be delivered at the Parkes Museum, Margaret Street, W., on Thursday evenings at 8 p.m. The dates, subjects, and lecturers are:—on October 20, discussion on physical deterioration, to be opened by Mr. E. W. Brabrook, C.B.; on October 27, physical condition of working class children, by Dr. T. J. Macnamara, M.P.; on November 10, mental hygiene in childhood, by Dr. T. B. Hyslop; and on November 24, education of girls, by Miss M. E. Findlay.

THE session of the London School of Tropical Medicine was opened on Friday last with an inaugural address by Sir Charles Bruce, G.C.M.G., ex-Governor of Mauritius, Sir John Craggs presiding. Sir Charles Bruce detailed some of his experiences in the colonies, and gave interesting particulars, from the layman's point of view, of tropical diseases with which he had come in contact, notably the remarkable outbreaks of malaria and of surra in Mauritius. Sir Patrick Manson, in the course of proposing a vote of thanks, directed attention to the munificence of Sir John Craggs in giving a scholarship and prize to the school, and expressed a hope that funds for endowment might soon be forthcoming.

In the October number of the *Century Magazine* Mr. Gilbert Grosvenor, in an article entitled "Inoculating the Ground," describes the method of preparing and using the cultures of nitrifying micro-organisms which are now being employed as fertilisers under the name of nitragin; photographs are given of two plots side by side, one of which had been planted with inoculated and the other with uninoculated seeds, also of the average plants from each plot. There is a surprising difference between the two, the crop from the inoculated plot being much the more luxuriant, and Mr. Grosvenor expresses the opinion that there is not a section of the United States which will not profit by the use of nitragin.

THE New York correspondent of the *Lancet* announces that the Bureau of Chemistry of the National Department of Agriculture is about to establish a laboratory in New York for the examination of imported foods and the detection of adulterations and imperfections. The occasion

which led the national authorities to create this laboratory was the result of a recent investigation which proved that in the last two months three shiploads of food products imported into New York were returned to the ports whence they came on account of the adulterations found. The new law requiring a thorough examination of the food products imported into the United States is being rigidly enforced, and this new laboratory is a proof that the investigation is to be on a large scale.

WE have seen with regret the announcement of the death of Mrs. Isabella Bishop, the well known traveller and author, at the age of seventy-two. Mrs. Bishop was the eldest daughter of the Rev. Edward Bird, and became a traveller on account of her continued ill-health. A visit to Prince Edward Island resulted in her first book of travel. Later sea voyages were ordered to the Mediterranean, America, Australia, and New Zealand, and Miss Bird returned by way of the Sandwich Islands, where she spent some months, and she also visited the Rocky Mountains, describing her adventures in two books which were published in 1873 and 1874. Miss Bird next began her travels in the East. She seems to have been the first European woman who made her way into the heart of Japan, and her "Unbeaten Tracks in Japan" (1880) records her experiences. Her "Journeys in Persia and Kurdistan," in two volumes, appeared in 1892—the year when she was elected the first lady fellow of the Royal Geographical Society—and "Among the Tibetans" in 1894. In 1896 she published an interesting collection of photographs which she had herself taken in western China and Korea. Her travels in Korea, Siberia, and China lasted for three years, and their results are shown in "Korea and her Neighbours" (1898). Since then have appeared from her pen "The Yangtse Valley and Beyond" (1899), and "Pictures from China" (1900).

PROF. FRIEDRICH RATZEL, whose death occurred on August 9, was one of the foremost in the band of ardent geographical students who have done so much, on the Continent at least, to win for their subject recognition, both as a valuable intellectual discipline and as a fundamental part of the training of all who aspire to a leading place in public affairs. While not confining himself to any one branch of the subject, it is as an exponent of the geography of man that Ratzel will be principally remembered. By his development and clearer definition of the principles enunciated by Carl Ritter and his school, of the influence exercised throughout human history by natural environment, he may almost be said to have created a new department of study, which, under the somewhat clumsy name of anthropogeography, has taken a firm hold in the educational curricula not only of Germany, but of France and other European countries, while his influence has likewise been felt, if in a less degree, in our own country. Brought up as an apothecary's assistant, Ratzel seized every opportunity of improving his scientific knowledge, zoology being in these early days his favourite study. But it was as a travelling correspondent (1869–75) in central and southern Europe, in the United States, Mexico, and the West Indies that his geographical leanings first found scope, the utilisation of which brought him eventually, as university professor, to the distinguished chair at Leipzig, where for the rest of his life he continued to exercise a predominant influence on the progress of higher geographical education in Germany. In addition to his "Anthropogeographie," by which he is perhaps best known, Ratzel was the author of important works on the United States, on the races of man, and on political geography from the comparative standpoint.

In its September issue, the *Field Naturalists' Quarterly* publishes the first two of a series of plates (reproduced from photographs) illustrative of the development of the frog. Among the other contents, we may allude to an illustrated article by Miss O. Hill on the acquisition of a portion of Ullswater for the nation, and to the fifth part of Mr. J. L. Kershaw's "The Naturalist in China," which is illustrated with exquisite portraits of the "rainbird" and the Chinese francolin.

THE *South-Eastern Naturalist* for the current year contains Mr. F. W. Rudler's presidential address to the South-Eastern Union of Scientific Societies, in which, after allusion to several points connected with the geology of the district, reference is made to the future of these and similar bodies. Now that many local societies have been relieved of the custody and up-keep of their museums by the county councils, it has been suggested that their work is practically over, and that they should prepare for winding-up their affairs. With this the president does not agree, pointing out that local societies have plenty to do in cataloguing the natural history and archaeological products of their respective districts, to say nothing of recording the meteorology. The volume includes notes on the Lepidoptera of mid-Kent by Captain Savile Reid, and a list of localities for uncommon plants by Mr. W. H. Griffin.

PARTS ii. and iii. of the thirty-second volume of Gegenbaur's "Morphologisches Jahrbuch" contain several important papers on vertebrate morphology. In the first of these Dr. K. Kjellberg reopens the question of the homology of the various elements in the articular region of the jaw of mammals and saurosidans, devoting special attention to the meniscus of cartilage found between the mandibular condyle and the glenoid cavity of the squamosal in many mammals. The author considers that the quadrate of saurosidans represents the incus of mammals, and the articular of the former the malleus of the latter. The mammalian meniscus is, on the other hand, to a great degree a new element, since it is formed by the cutting off of the upper part of the external pterygoid muscle as it passes between the jaw-articulation to the malleus (its connection in the Sauropsida being with the articular). In another article Dr. A. Schumann points out the curious parallelism between the osteology of the hind-leg of the jerboa and that of birds. In a third Prof. H. Dexler describes the histology of the central nervous system of ungulates, while in a fourth Messrs. Fleischmann and Blendiger discuss the cribriform bones of the nasal cavity of mammals. A fifth article, by Dr. U. Böhi, is devoted to the study of the visceral cavity and genital appendages of the salmon.

In the third part of vol. lxxvii. of the *Zeitschrift für wissenschaftliche Zoologie* Mr. L. Freund describes in detail the osteology of the flippers of the dugong as displayed in "sciograph" pictures, of which several are reproduced in the plates accompanying the article. It has long been known that the carpus of the adult consists of three large bones. Of the two in the first row, the one is now shown to consist of the fused radiale and intermedium, and the other of the ulnare plus the pisiform and the fifth carpal, the distal bone being composed of the four inner carpalia. In the manati the reduction of the carpus has been carried to a less extent, the radiale being in some instances distinct from the intermedium, while in other cases in which these two bones are fused the four inner carpalia remain separate. Studies in the oligochaete worms by Mr. A. Ditlevsen, and investigations into the development of the eye of the bee by Mr. O. Dickel, complete the contents of this number.

NO. 1824. VOL. 70]

In the fourth and concluding number of the same volume special reference may be made to a richly illustrated article by Dr. E. Mascha on the minute structure and development of the flight-feathers of birds. It is specially noteworthy that cells of two types are found in the medulla of the quills, those of one type being very common, while those of the second occur in the owls and the nightjars—a feature confirming the alliance of these two groups. Elaborate diagrams of the different types of feather-structure characteristic of various groups illustrate the memoir.

A PRICE list of botanical apparatus has been recently received from Messrs. Gallenkamp, Sun Street, Finsbury Square. The apparatus required for plant physiology is a special feature, and the various pieces have been prepared in accordance with Detmer's practical book. A particularly useful item is a standard barometer which is priced at 3*l.* 7*s.* 6*d.*, working on the Fortin principle.

THE latest number of the *Records* of the Botanical Survey of India, vol. iii., No. 1, contains an account by Captain A. T. Gage of the vegetation of the district of Minbu, in Upper Burma. The district shows three distinct regions, a mountainous zone of the Arracan Yomahs and parallel ridges, an alluvial belt fringing the Irawaddy, most of which is under cultivation, and an intermediate desert zone, which lies between the two former. The systematic census is confined to the plants collected on an expedition which only extended over one month. A list of economic and medicinal plants is appended.

THE exact nature and purpose of the spines which bristle on the surface of so many Cactaceæ and similar xerophytes must have puzzled many observers and have not been satisfactorily determined. Dr. Darbishire takes up this subject in the *Annals of Botany* (July), and bases his views on an investigation of *Mamillaria elongata*. His conclusions do not coincide with previous explanations, but he gives reasons for maintaining that the tubercle, from which the spines arise, represents a leaf base, and possibly also a part of the stem, while the spines are modified portions of the leaf-blade, and act as a *paraheliode* or screen against excess of sunlight.

WE have received from the Deutsche Seewarte the results of meteorological observations made at selected stations for the lustrum 1896–1900, and for the twenty-five years 1876–1900. The results for each lustrum, from 1876 to 1895, have been previously published; the present volume differs from those which have already appeared by giving the dates on which the extreme values were observed. A table has also been added showing the average number of days in each month, and for each station, on which the rainfall has exceeded 0.2 mm. (0.008 inch). The work is a valuable contribution to the climatology of the German Empire.

AT the jubilee meeting of the Central Meteorological Office of Vienna on October 26, 1901, the Minister of Public Instruction promised that the meteorological results of the previous fifty years should be published in a monumental work, giving an exhaustive representation of the climate of the various parts of the Austrian Empire. The first portion, dealing with the climatology of Lower Austria, has been published by the Vienna Meteorological Office, and has been prepared by Hofrath Dr. Hann, formerly director of the Austrian Meteorological Service, to serve as a pattern for the future discussion, on a uniform plan, of the meteorology of the fifteen other provinces. It is obvious that such a gigantic work would be beyond the powers of any one individual, and it is also desirable that the discussions relating to various districts

should be prepared by persons who have lived in them and have made special studies of the varied conditions of climate. Undoubtedly no meteorologist living could be found who is better qualified than Dr. Hann, whose laborious works are well known to our readers, to prepare a pattern for the guidance of the persons undertaking the subsequent parts. His memoir embraces 104 pages, containing fifty years' monthly and yearly means of different localities, a general summary, and special discussions of the more important phenomena. The work is in every respect worthy of the very high reputation of its author.

AN interesting note on the form of Britain, as described by Tacitus, is contributed to the Lombardy *Rendiconti* (xxxvii., 16) by Prof. Giovanni Ferrara, who considers that, of all the Romans, Tacitus had the clearest ideas as to the configuration of our island, and that Ptolemy's map was to a large extent founded on his descriptions.

PROF. LUIGI GABBA, writing in the Lombardy *Rendiconti*, (2) xxxvii., 16, discusses the problem of teaching chemistry for technical purposes in Italy, and strongly supports the recent resolutions proposed at the Turin Congress of 1902 by Prof. Cannizzaro urging the Government to provide instruction in technical chemistry, in addition to the existing university instruction of a more theoretical character.

THE learning of modern languages is of such importance to science workers that interest attaches to Prof. Charles C. Ayer's paper on the subject in the University of Colorado *Studies*. The author considers that the ability to speak a foreign language fluently depends very largely on a kind of dramatic instinct or power of imitation which seems to project the speaker into a new and foreign personality, and he instances the case of Americans who return from a comparatively short residence in England, letter perfect in the English pronunciation, vocabulary, phrasal intonation, and English manner generally.

WHAT is the "Codex Atlanticus"? is a question which Signor Luca Beltrami answers in a paper reprinted from *Lettera*, and published at the offices of the *Corriere della Sera* at Milan. The name has been given to one of the most interesting works of Leonardo da Vinci, on account of its resemblance in form to an atlas. In 1637 it was given to the Ambrosian Library at Milan, and a reprint has now been produced under the auspices of the Reale Accademia dei Lincei, of which Messrs. Hoepli, of Milan, have a few copies still in their hands. The thirty-five parts occupy more than 1300 pages, and contain 1384 heliotype illustrations, many of them in colours. The edition was limited to 280 copies, the first of which was presented to President Loubet on his visit to Milan. The work of transcription was undertaken by Dr. Giovanni Piumati, and an interesting feature of the first part is the preface, written by the late Prof. Francesco Brioschi, describing the history of the "Codex" from the death of Leonardo da Vinci to the present date.

M. CHARLES FÉRY describes in the September part of the *Journal de Physique* a convenient form of telescope pyrometer for measuring temperatures between 500° and 1200°. The heat rays are concentrated by a silvered concave mirror upon a thermo-couple placed at its focus; the reading of a galvanometer connected with the thermo-couple gives the temperature, and the instrument is so designed that the indications are independent of the dimensions of the source of heat and its distance.

THE August number of the *Physical Review* contains an interesting note by Mr. W. Coblentz on the infra-red absorption spectrum of selenium. Whereas commercial selenium, which contains sulphur, gives immediately after fusion and re-solidification an absorption which rapidly and regularly increases from 1μ to 14μ , after two days it shows nearly a constant transmission throughout the whole of the same range. This peculiar change in transparency is not observed with pure selenium, as the same transmission curves are obtained immediately after solidification and after an interval of thirty days. It is a striking fact that the transmission curves of sulphur are totally different in character from those of selenium.

A PAPER by Mr. F. E. Hackett on the photometry of the n -rays, which is published as part x. of vol. viii. of the *Transactions of the Royal Dublin Society*, appears at a very opportune moment. In view of the failure of Profs. Rubens and Lummer to reproduce M. Blondlot's results, and Prof. R. W. Wood's strictures on the methods hitherto employed in their investigation, a method for their quantitative measurement becomes particularly worthy of notice. Mr. Hackett has studied the variation of sensitiveness over the retina when habituated to darkness, and claims to have eliminated in this way all subjective variation. The method of measurement adopted shows that whilst the n -rays emitted by unannealed glass cause an increase of approximately 10 per cent. in the brightness of a phosphorescent screen, the increase produced by a silent tuning fork is very small, being about 3 per cent. The experiments described are stated to be of such a nature that any person without special training with a little patience may reproduce them.

IN the August number of the *Physical Review* Mr. K. E. Guthe has made a comparative study of the various types of silver voltameters which are used for measuring the strength of electrical currents. From the measurements which are recorded it appears that there are two distinct classes of silver voltameters, one class including the ordinary type and Leduc's modification, the other Richard's and the "large anode" types. The voltameters of the second class give a deposit weighing about 0.05 per cent. less than that given by the first class. It appears that in those types of voltameters in which the anode is enveloped merely by filter paper or muslin, the heavy liquid surrounding the anode penetrates through and reaches the cathode, depositing there a complex silver ion. As a consequence, the observed increase in weight is greater than that corresponding with the true electrochemical equivalent of silver. In Richard's voltameter and the "large anode" modification, the deposition of a complex ion is prevented by surrounding the anode with a porous pot so as to exclude contact between the anode-liquid and the cathode. As in this case the variation in the amount deposited by the same current in various experiments does not exceed 1 in 10,000, it is recommended that, in future, the "legal" form of silver voltameter should be superseded by the improved form. A re-determination of the electrochemical equivalent of silver gave a mean value of 1.11683 mg. per coulomb.

THE publication committee of the Chemical Society has adopted the word "radicle" in the place of "radical" in their publications. The alteration does not meet with the approval of a hundred and seventy-nine fellows of the Society, who have addressed a letter to the president of the society asking him to bring the matter before the publication committee with a view to its alteration. The signatories point out that:—(1) The new word "radicle" does not convey the sense which the authors of the word

"radical" intended, or that which is still attached to it in chemistry. (2) The use of "radical," though coming through the French, can be defended on purely philological grounds. (3) The original word should be retained out of regard for its historical origin for the same reason that we still employ the word oxygen, although the original meaning has been modified. (4) The original word "radical" is still retained by continental countries and America, and it is only in this country that the change has been made.

MESSRS. F. H. PARSHALL and H. M. Hobart have in hand a work on electric traction which will shortly be published by Messrs. Constable and Co.

A SECOND, revised edition of Dr. C. B. Davenport's "Statistical Methods with Special Reference to Biological Variation" has been published by Messrs. John Wiley and Sons in New York, and by Messrs. Chapman and Hall, Ltd., in this country. The first edition of the book was reviewed in our issue of December 14, 1899, when the opportunity was taken to suggest one or two directions in which improvement was desirable. In addition to the adoption of some of these suggestions, Dr. Davenport has embodied many of the new statistical methods elaborated by Prof. Karl Pearson and others in the new edition of his work.

THE new edition of Dr. A. R. Wallace's work on "Man's Place in the Universe," which has just been published by Messrs. Chapman and Hall, Ltd., at the price of six shillings, contains an appendix in which an argument based on the general theory of organic evolution is used to support the conclusion arrived at as to the unique development of man in the material universe. With this exception, the work remains practically in its original form; for Dr. Wallace remarks that few errors in his facts or fallacies in his conclusions have been brought under his notice, while as to the argument, no student of science has dealt with it in any detail, and "no biologist appears to have thought it worthy of careful consideration."

OUR ASTRONOMICAL COLUMN.

DISCOVERY OF A NOVA OR A NEW VARIABLE.—*Circular* No. 68 from the Kiel Centralstelle announces the discovery of a nova or a new variable star by Mr. Stanley Williams, of Hove, on September 20.

The object was first observed on a photograph taken with a 4.4-inch portrait lens between 15h. 59m. and 16h. 23m. (G.M.T.) on the date named, and was then of about the ninth magnitude, its approximate position being:—

R.A. = 22h. 19.0m., dec. = +29° 44'. (1855).

Eleven other plates of the same region, taken between September 27, 1899, and January 16 this year, show no trace of any object in that position, although most of them show stars of the eleventh magnitude or fainter, whilst two plates show stars down to the thirteenth magnitude.

On October 3 the star was observed visually with a 6.5-inch reflector, and was estimated as being about one quarter of a magnitude fainter than B.D. +29°.4655 (9.1 mag.). Its colour was recorded as intensely red, almost crimson, and was not unlike that of Nova Persei at the epochs when that object became red.

The above position lies in the constellation Pegasus, about 2° south of the middle of the straight line joining η and π Pegasi.

THE LICK OBSERVATORY PROGRAMME FOR NEXT YEAR'S SOLAR ECLIPSE.—Mr. William H. Crocker has generously undertaken to defray the cost of the Lick Observatory

expeditions to observe the total solar eclipse of August 30, 1905. Three expeditions will be fitted out, one going to Labrador, another to Spain, and the third to Egypt.

At each of these stations the programme will include a photographic search for an intramercurial planet and the photographing of the corona with a camera of 5 inches aperture and 40 feet focus.

The Spanish expedition also proposes to make a study of the polarised light in the corona, and to obtain spectrograms of the sun's edge at second and third contacts and of the green coronal line; the latter are to be used expressly for the measurement of the wave-length of that line.

Attempts will also be made to secure spectra of the "flash" and of the general light of the corona at both the Spanish and the Egyptian camps (*Science*, September 23).

VISUAL OBSERVATION OF PHOEBE.—Whilst searching for Saturn's ninth satellite, Phœbe, with the Yerkes 40-inch telescope on August 8, Profs. Barnard and H. H. Turner found an object resembling a star of about 15.5 or 16.0 magnitude the apparent place of which at 18h. (G.M.T.) was

R.A. = 21h. 23m. 1.0s., dec. = -16° 36' 8".

On September 3 Prof. Barnard found that the object was missing from this place.

As the Harvard ephemeris for the satellite gives the approximate place on August 8 as

R.A. = 21h. 23m. 0s., dec. = -16° 36'.4,

the above was probably the first visual observation of this object.

An editorial note attached to the paragraph in the *Astronomische Nachrichten* (No. 3970) in which the above information is recorded enters a *caveat* as to the actual correctness of the figures given, because the manuscript received was very badly blotted.

THE ORBIT OF CASTOR.—A graphically determined orbit of Castor was published in No. 3525 (1898) of the *Astronomische Nachrichten*, but since its publication Prof. Doberck, of Hong Kong Observatory, has determined the three sets of possible elements given below by purely analytical methods, and now publishes them in No. 3970 of the same journal, together with a five-yearly ephemeris calculated from the set of elements No. 4.

The observed angles can be represented equally well by orbits having periods of 200 to 600 years, or even more, but the observed distances are best given by the No. 4 set of elements, which also appears to represent correctly the present decrease in distance.

Elements.

	III.		IV.		V.
δ =	29° 29'	...	33° 56'	...	42° 34'
λ =	84° 44'	...	82° 26'	...	118° 11'
γ =	73° 3'	...	63° 37'	...	61° 56'
e =	0.7513	...	0.4409	...	0.2321
P =	268.16 years	...	346.82 years	...	501.80 years
T =	1936.65	...	1969.82	...	1963.30
a =	7".3265	...	5".756	...	6".467

According to the ephemeris, the position angle at the beginning of 1900 was 225°.72, and the distance was 5".627; at the commencement of 1905 the corresponding figures will be 223°.58 and 5".564.

In the same publication Prof. Doberck gives a set of elements, and a yearly ephemeris, for the orbit of ζ Sagittarii.

THE MEETING OF THE ASTRONOMISCHEN GESELLSCHAFT, 1904.—In No. 3970 of the *Astronomische Nachrichten* Herr Elis Strömberg gives a brief outline of the papers read at the meetings of the Astronomischen Gesellschaft, which took place at Lund on September 5-8 under the presidency of Prof. Seeliger. Numerous reports of the work suggested by the committee were given by the observers by whom it had been undertaken.

Among these there are reports by Herr Albrecht on the International Latitude Service, by Herr Müller on the catalogue of variable stars, and many others.